A61 A Correlation Study Between Sample Age, Human Salivary a-Amylase Activity, and DNA Quantity on Postage Stamps

Emily B. Herren, MFS, 12340 Midsummer Lane #4B102, Lake Ridge, VA 22192; Laura E. Dolezal, MFS*, 3021 Appomattox Avenue #104, Olney, MD 20832; and Daniele S. Podini, PhD*, 2036 H Street, Northwest, Samson Hall, Room 301, Department of Forensic Science, Washington, DC 20052*

After attending this presentation, attendees will be informed of an optimized extraction method for obtaining profile data from aged postage stamp samples. Attendees will also be presented with the current findings obtained in this study with regards to a possible correlation between salivary a-amylase activity and DNA quality and quantity in degraded samples such as old postage stamps.

This presentation will impact the forensic science community by demonstrating that DNA and a-amylase appear to remain present on postage stamp samples over periods of time up to at least 83 years (both remained present on stamps that dated back to 1925). It also presents the findings that the starch-iodine test for a-amylase activity is not a reliable predictor or presumptive test for the quality and quantity of DNA on postage stamp samples.

The George Washington University Department of Forensic Sciences received a donation of 15 postcards mailed between 1918 and 1946 to the same address; all of the postcards were supposedly stored together in the same environmental conditions (unknown) until their donation to the university in 2008. The 15 postcards included six different types of postage stamps with either red or green dyes, a cost of one or two cents, and all but one of the stamps were United States postal stamps, with the other being a Canadian postal stamp. It was hypothesized that using a simple test for α-amylase, testing for the presence of active salivary α-amylase in a postage stamp sample could potentially be used as an indicator for the quality and quantity of DNA in the sample. Ultimately it was thought that this could be used as a screening tool to infer the likelihood of obtaining an interpretable STR profile.

Starch-iodine agarose plates were used to test for the presence of α- amylase activity on all postage stamp samples. A modified organic extraction method with ethanol and Microcon 100 purification and concentration was used to extract any potential DNA from all postage stamp samples. The extractions were quantified using Real-time PCR and amplified with a commercially available DNA kit. Low Copy Number (LCN) amplification was performed on samples that exhibited characteristics of degradation.

Out of the 15 postage stamp samples, ninety-five percent of the samples resulted in detectible α-amylase activity, and eighty percent of the stamps resulted in detectable amounts of extracted DNA. Of the eighty percent of the samples that resulted in detectible amounts of extracted DNA, approximately forty percent of the samples resulted in an STR profile of greater than or equal to eight of the 16 kit loci, and fifteen percent of the samples resulted in full STR profiles with all 16 kit loci. Various levels of contamination were observed from unknown external sources. The data provided no support for any correlation between the age of the stamp and the α-amylase activity and DNA quantity and quality obtained.

It was concluded that due to the lack of a correlation between the α- amylase activity and DNA quantity and quality on postage stamp samples, testing for salivary α-amylase activity is not a reliable presumptive test for the likelihood of obtaining a DNA profile from postage stamp samples. The age of the postage stamp samples also did not seem to affect the presence of α-amylase activity or DNA as greatly as other unexamined factors such as the actual action of licking the stamp, the handling of the stamps, and the stamp components such as dyes and adhesives.

Postage Stamp, Salivary a-Amylase, DNA

 ** Presenting Author*